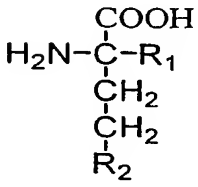
What is claimed is:

1. An anti-mycobacterial composition comprising a mycobacterial glutamine synthetase (MbGS) inhibitor of Formula 1:

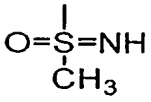


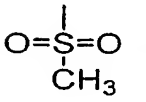
Formula 1

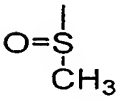
wherein:

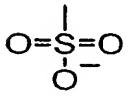
R_1 = branched and straight-chain alkyl groups of 1 to 8 carbons, and

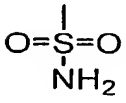
R_2 = tetrahedral group selected from the group consiting of:

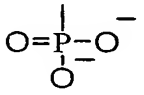
 Methyl Sulfoximine

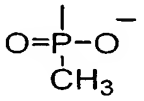
 Methyl Sulfone

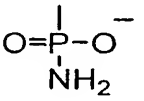
 Methyl Sulfoxide

 Sulfonate, and

 Sulfonamide; and

 Phosphonate

 Phosphinate

 Phosphonamide

wherein said anti-mycobacterial composition effectively inhibits MbGS but does not substantially inhibit mammalian glutamine synthetase (MGS) in vivo.

2. The anti-mycobacterial composition according to claim 1 wherein said R_1 is branched and straight-chained alkyl groups of from two to four carbons.

3. An anti-mycobacterial composition comprising alpha-methyl-D,L-methionine-SR-sulfoxamine (α-Me-MSO) or alpha-ethyl-D,L-methionine-SR-sulfoxamine (α-Et-MSO) wherein said anti-mycobacterial composition effectively inhibits MbGS but does not substantially inhibit mammalian glutamine synthetase (MGS) in vivo.

4. An anti-mycobacterial composition comprising alpha-methyl-L-methionine-S-sulfoxamine (α-Me-MSO) or alpha-ethyl-L-methionine-S-sulfoxamine (α-Et-MSO) wherein said anti-mycobacterial composition effectively inhibits MbGS but does not substantially inhibit mammalian glutamine synthetase (MGS) in vivo.

5. A method for treating, palliating or inhibiting mycobacterial infections in a mammal comprising:

administering to a mammal having a mycobacterial infection an anti-microbial effective amount of an anti-mycobacterial composition comprising gamma-substituted alpha-amino-alpha-alkyl-butyrates that effectively inhibit mycobacterial glutamine synthetase (MbGS), but do not substantially interfere with mammalian glutamine synthetase (MGS) in vivo such that said mycobacterial infection is treated, palliated or inhibited.

6. The method for treating mycobacterial infections in a mammal according to claim 5 wherein said administering step further comprises said gamma-substituted alpha-amino-alpha-alkyl-butyrate wherein said alpha alkyl group is branched and straight-chained alkyl groups from 2 to 8 carbons and said gamma substituent is a tetrahedral sulfur or phosphorus group.

7. The method for treating mycobacterial infections in a mammal according to claim 6 wherein said alpha alkyl group is branched and straight-chained alkyl groups from 2 to 4 carbons.

8. The method for treating mycobacterial infections in a mammal according to claim 6 wherein said tetrahedral sulfur group is selected from the group consisting of methyl sulfoximine, methyl sulfone, methyl sulfoxide, sulfonate, and sulfonamide

9 The method for treating mycobacterial infections in a mammal according to claim 6 wherein said tetrahedral phosphorus group is selected from the group consisting of phosphonate, methylphosphinite, phosphonamide.

10. A method for treating, palliating or inhibiting mycobacterial infections in a mammal comprising:

administering to a mammal having a mycobacterial infection an anti-microbial effective amount of an anti-mycobacterial composition comprising alpha-methyl-L-methionine-S-sulfoxamine (α-Me-MSO) or alpha-ethyl-L-methionine-S-sulfoxamine (α-Et-MSO) wherein said anti-mycobacterial composition effectively inhibits MbGS but does not substantially inhibit mammalian glutamine synthetase (MGS) in vivo.

11. The method according to claim 5 further comprising co-administering an anti-microbial effective amount of isoniazid (INH).

12. The method for treating, palliating or inhibiting mycobacterial infections in a mammal according to any one of claims 5 to 11 wherein said mammal is selected from the group consisting of humans, monkeys, cows, pigs, horses, rabbits, rodents, cats and dogs.

13. The method for treating, palliating or inhibiting mycobacterial infections in a mammal according to any one of claims 5 to 11 wherein said mycobacterial infection is caused by a member of the genus Mycobacterium selected from the group consisting of M. tuberculosis, M. bovis, M. avium.

14. A method for treating, palliating or inhibiting mycobacterial infections in a mammal comprising:

co-administrating and anti-mycobacterial effective amount of L-methionine-SR-sulfoximine (MSO) and ascorbic acid.